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ABSTRACT

Some school administrators may feel that initial investments in instructional computing programs were sufficient, and that the programs do not merit continued support. Information on fund allocation for outstanding instructional computing programs can be useful to the "typical" school administrator seeking advice on how best to allocate the limited funds available for instructional computing. During the fall of 1987, a study investigated the budgetary characteristics of 73 elementary schools believed to have developed outstanding instructional computing programs. The schools were surveyed to determine (1) whether and for how long computer expenses had been permanent line items in the schools' budgets; (2) the computer-related costs per student for a 2-year period; and (3) the portion of schools' complete computer budgets allocated to each computer-related expense category. The survey found that computer expenses were not permanent line items in the budgets of over 70% of the schools studied; that the median computer-related expense per student dropped dramatically over the period studied; and that the largest portion of schools' budgets was going toward hardware, followed by software, staff development, and equipment maintenance. In conclusion, educational leaders should strive to reverse the apparent trend toward falling budgets and raise expenditure levels enough to both successfully implement and support instructional computing programs. (5 references, 3 tables, and 1 figure) (NRP)

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ELEMENTARY SCHOOL INSTRUCTIONAL COMPUTING: DON'T LET ADMINISTRATORS FEEL THEY'VE ALREADY PAID THEIR DUES

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by

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Has increased emphasis on AIDS awareness, teen suicide prevention, drug education, and other current social issues caused American public school administrators to shift their support from instructional computing to other programs? How prevalent among these administrators is the feeling--"we've already purchased the computers we need, now it's time to concern ourselves with other important educational issues." Are the extant microcomputers being well used or has lack of continued support caused them to be relegated to the back shelves with other technological relics of the past?

As school administrators face increased calls for budgetary accountability, they must also justify computer use in ways that are educationally sound and fiscally supportable. How can computers be used in ways that justify the expense they represent? These questions and related issues suggested the need for a study to determine how administrators representing some of the nation's leading elementary school instructional computer programs use their machines instructionally to ensure that they get the maximum "bang" for their computer bucks.

During the late fall of 1987, a study investigated the instructional computing practices of elementary schools selected for the high quality of

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their programs. The study included an examination of the schools' budgetary practices pertaining to their instructional computing programs. The manner in which school leaders allocate their available funds speaks volumes about the importance they afford to each budgetary item. The opinions of leaders whose elementary school instructional computing programs are considered as high quality can be especially useful to the "typical" school administrator seeking advice on how best to allocate the limited funds available for instructional computing.

The national search identified 73 elementary schools with high quality instructional computing programs. The Office of Technical Assessment (OTA) in Washington, D.C., supplied a list of districts known for their support of instructional technology. Representatives from these districts then recommended the particular elementary schools within their areas which they believed had developed the most outstanding instructional computing programs.

After selection, these schools were then surveyed (with a 70% response rate), using an instrument designed to gather data on selected topics relating to instructional computing. Among the elements investigated were characteristics relating, either directly or indirectly, to budgetary practices: the presence or absence of computer expenses as permanent line items in the budget, details of the 1986 and 1987 computer budgets, and the total expense on computer-related items.

The first issue considered whether computer expenses were permanent line items in the schools' budgets and, if so, for how many years. The data

showed that only 29% of the schools had computer expenses as permanent line items in their budgets. Of these, 29%, varied in the amount of time for which that had been true. 60% of the schools had maintained the line item for four or more years, 27% for three years, and the other 13% for only two years. However, nearly two-thirds of the schools surveyed (65%) indicated that computer expenses were still not permanent line items in their budgets.

The next issue involved the manner in which available funds had been allocated for 1986 and 1987 computer related expenses. The available data were manipulated to determine the total computer related costs per student for the two years considered. The resultant per student figures permit easier analysis by avoiding the complicating influence of student body size. The percentage distributions of the per student budget information for 1986 and 1987 is presented in Table I.

The first two columns to the right of the per student figures illustrate the percentage of schools spending those amounts in 1986 and 1987. The figures for 1986 and 1987 show the total per student computer expenses reported by respondents, including staff development and equipment maintenance costs. The column on the far right lists the percentage distribution for the average annual per student expenses. That figure represents the costs incurred annually during the development of the instructional computing programs (total cost divided by the number of years computing; that answer divided by the total number of students). The average annual per student figure includes only the costs of hardware, software and computer-related materials.

The table shows a downward trend in the per student expenses during the last several years, particularly when the average annual per student expenses data are included in the comparison. For instance, in 1987, 53% of the schools spent less than $10 per student on computer related items. In 1986, 47% of the schools spent less than $10 per student. Only 12% of the schools spent less than $10 per student during the years in which they were developing instructional computing programs. If only the schools which supplied valid data are included in the calculations, the trend is even more apparent. Of those schools supplying data, 64% spent less than $10 in 1987, 52% spent less than $10 in 1986, and only 12% spent less than $10 during the years that they were developing their instructional computing programs.

The conclusion that expenses have declined during recent years can be graphically illustrated by an examination of the means and medians for the percentage distributions presented in Table I (see Table II). The mean for the average annual expenses was $28.90; the mean for 1986 expenses was $18.75; the mean for 1987 was $15.02. The pattern is even more striking for the medians since the presence of several large outliers is less significant. The median for the average annual expenses was $20.00; for 1986, it was $8.80; for 1987, it dipped to $4.90. Thus, after five years of roughly $20 per student annual expenses to develop the program, the typical school expense dropped to less than $5 per student by 1987.

The importance of this dramatic decline may be mitigated, to an extent, because of differences in the wording of the three relevant survey

questions. In determining the average annual expenses, the data used reflected expenses, regardless of the source of the funds. The data used to determine the 1986 and 1987 computer budget figures, however, reflected only the monies specifically available for allocation by the building principal. Nevertheless, it is worth noting that the average annual expense figures do not include either staff development or equipment maintenance costs, whereas the figures for 1986 and 1987 do. Thus, the decline in per student expenses is evident despite the inclusion of additional budget categories in the 1986 and 1987 figures.

The itemized budget data for the years 1986 and 1987 are presented, using means and medians, in Table II. The table indicates, in an approximate fashion, the manner in which the available funds were allocated by school leaders for the two years.

It seems probable that some portion of the total funds used to develop the high quality instructional computing programs came from sources other than the principals' budgets--for instance, fund-raisers or grants. However, if the large differences detected were mainly attributable to outside funding sources, then those sources must have accounted for the majority of the available funds over the years that the programs were being developed. When the 1986 and 1987 figures are compared, the declines of 56% between the two medians and of 25% between the two means (from 1986 to 1987) suggest that the budgets may fluctuate widely. Unfortunately, the study lacked the data necessary to clarify questions of budget allocations beyond the two years specified.

The final issue involved the manner in which the monies available for computer expenses were allocated for 1986 and 1987. Again, the data were examined using per student figures to enhance their value for further interpretation. More than one-half of the schools spent less than ten dollars per student for hardware in both 1986 (51%) and 1987 (53%). Well over one-half of the schools spent lower than two dollars per student for software in both 1986 (68%) and 1987 (57%). Staff development expenses were even less, with the large majority of schools spending less than one dollar per student in 1986 (61%) and 1987 (67%). Finally, equipment maintenance expenses were the smallest part of the budgets, with the majority of schools spending no money at all on maintenance either in 1986 (59%) or 1987 (51%).

The major budget item both years was the purchase of hardware. Expenses for hardware were followed sequentially in importance by expenditures for software, staff development, and equipment maintenance costs. The sizeable differences, proportionally, between the means and medians for all the budget items reflect the influence of very large outliers which had a much greater mathematical impact on the means than on the medians.

Table III displays the 1986 and 1987 means from Table II to examine the proportional allocation of the available funds. This table, makes clear that hardware expenses accounted for a large majority of the computer budget expenses in both 1986 (65%) and 1987 (73%). Furthermore, while software costs have remained the second largest expense, the portion of the total budget spent on software dropped from 24% in the 1986 to 15%

in 1987. Staff development and equipment expenses, although accounting for a minimal part of the budgets, both remained relatively constant over the two year period considered.

The average annual per student expense figure shows a strongly positive correlation with the average per student expenses for 1986 and 1987 (the amounts for those two years averaged). Only 76% of the respondents supplied the data necessary for the calculations, but the data from those schools resulted in a Pearson Product-Moment Coefficient of Correlation (r) of .77. This finding supports the supposition that the pattern of declining computer expenses is highly consistent across the entire sample of schools. The relationship is illustrated with the scattergram in Figure I.

To summarize, then, the survey demonstrated that computer expenses are not yet permanent line items in the budgets of more than 70% of the schools studied. The median amount that school leaders spent each year for computer related expenses was roughly $20 per student during the years that they developed their computing programs, but the per student figure dropped first, in 1986, to $8.80 and then further, in 1987, $4.90 to per student. Of the $4.90 per student, budgetary allocation was divided between $3.57 for hardware, $0.74 for software, $0.44 for staff development and $0.15 for equipment maintenance.

The per student budgetary amounts supplied by the schools showed a noticeable difference from the figures supplied by either Moursund and Ricketts (1987) or Levin (1986). Moursund's and Ricketts' study suggested that per student expenses would total $8 for hardware and software alone

(with expenditures tripling in a five year period). Levin's findings that hardware costs accounted for 11% of the total computer expenses differed substantially from the percentage discovered in this study--that is, nearly 75% of the budgets.

Levin's research indicated that schools spent between $119 and $431 per student on software, a figure that is significantly higher than any amount which could be projected from the findings in this study. Additionally, Levin reported that providing students with 10 minutes of computer-assisted instruction per student per day cost roughly $120 a year, while Hawley et al (1986) found costs that were approximately one-third of those Levin reported, when the instructional setting examined was a classroom instead of a lab. But even Hawley's figures were substantially higher than those found in this study.

The per student expenditures are especially noteworthy in light of the study's other findings which include an indication that school leaders intend to shift the program emphasis from computer-assisted instruction to a greater use of computer applications. Application programs are frequently more hardware-intensive than computer-assisted leaning programs. Instructional computing programs will need more hardware and, concurrently, more--not less--financial support. Each school's instructional leaders must supply the necessary budgetary support. Obviously, the required support will not be provided by schools with continually declining computer budgets, nor by those lacking computer-related expenses as line items in their budgets. Neither situation can

provide the on-going financial support necessary for instructional computing programs to succeed.

Educational leaders must create long range plans to develop their instructional computing programs, taking into account the unstable nature of computer budgets, as they attempt, where possible, to eliminate the factors which create budgetary instability. In particular, leaders must strive to include computer expenses as permanent line items in their budgets.

The leaders should also strive to stabilize the expenditure levels of their computer budgets and raise them to an extent which permits them implementation of the programs they plan to support. In many cases, this will require substantial increases in the established budgets. In particular, funds should be provided for comprehensive inservice programs designed to encourage the integration of computers into the existing curriculum by regular classroom teachers.

The budgetary restrictions of the past several years have apparently had a great impact on the level of computer expenditure in the schools sampled. If this study's findings are indicative of budgetary practices in most elementary schools, then computer budgets are now falling quickly instead of rising rapidly. School leaders must attempt to alter this pattern. Educational leaders cannot afford to view instructional computing as yet another passing phase for which they have already paid their dues!

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TABLES AND FIGURES

Table I: Total Per Student Computer Expenses

Total Expenses per Student for Computer Related Items	% of the Total Schools in 1986	% of the Total Schools in 1987	Percent of the Total Schools for Annual Ave.
Less than $5	27%	43%	6%
Between $5 and $10	20%	10%	6%
Between $10 and $15	14%	8%	12%
Between $15 and $20	6%	4%	22%
Between $20 and $25	4%	0%	14%
Between $25 and $30	6%	4%	2%
Greater than $30	14%	14%	32%

Some data was not provided

Table II: Itemized Per Student Expenses

Specific item from Computer Budget	Mean 1986	Mean 1987	Median 1986	Median 1987
Hardware	$12.20	$10.90	$7.61	$3.12
Software	4.51	2.24	1.34	1.20
Staff Development	1.64	1.36	0.05	0.00
Maintenance	0.40	0.52	0.00	0.00
TOTAL BUDGET**	18.76*	15.02	8.80	4.90

* Due to Rounding

** Data are Total Budget figures, not column summations

Table III: Allocation of Computer Funds

Specific item from Computer Budget	Percent of the Total 1986 Budget	Percent of the Total 1987 Budget
Hardware Purchase	65%	73%
Software Purchase	24%	15%
Staff Development	9%	9%
Maintenance	2%	3%
TOTAL BUDGET	100%	100%

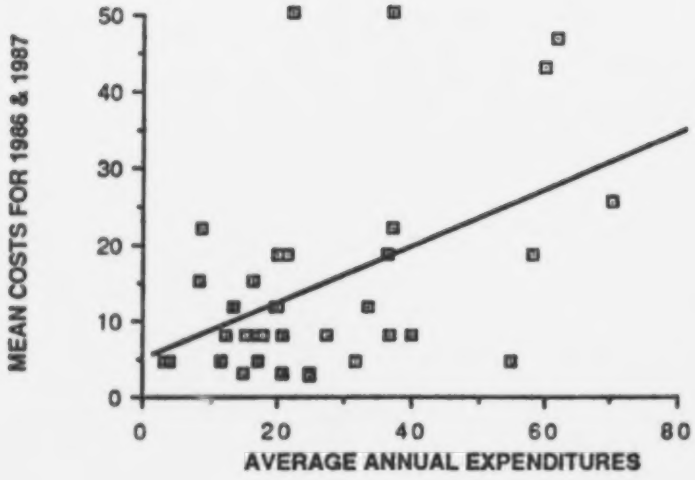

FIGURE I: BUDGETARY CORRELATION--ANNUAL / RECENT